

102:2019

CEB
SPECIFICATION

THREE PHASE TRANSFORMER TURNS RATIO TESTER



CEYLON ELECTRICITY BOARD
SRI LANKA



CONTENTS

	Page
1.0 SCOPE	3
2.0 SYSTEM PARAMETERS	3
3.0 SERVICE CONDITIONS	3
4.0 APPLICABLE STANDARDS.....	3
5.0 BASIC FEATURES.....	4
6.0 REQUIREMENTS FOR SELECTION.....	5
7.0 INFORMATION TO BE FURNISHED WITH THE OFFER.....	5
8.0 PERFORMANCE GUARANTEES AND WARRANTY	6
9.0 SAMPLES.....	6
10.0 SPARES	6
11.0 PACKING AND LABELING/MARKING	6
12.0 INSPECTION AND TESTING.....	7
13.0 ANNEX.....	7



SPECIFICATION FOR THREE PHASE TRANSFORMER TURNS RATIO TESTER

1.0 SCOPE

This specification covers the general requirements of the design, manufacturing and testing of Three Phase Transformer Turns Ratio Tester with accessories.

2.0 SYSTEM PARAMETERS

(a)	Nominal voltage (U)	230V/400V
(b)	System highest voltage (U_m)	240V/440V
(c)	System frequency	50 Hz
(d)	Number of phases	Single /Three Phase
(e)	Method of earthing	Effectively earthed
(f)	System fault level	25 kA

3.0 SERVICE CONDITIONS

(a)	Annual average ambient temperature	30 °C
(b)	Maximum ambient temperature	40 °C
(c)	Maximum relative humidity	90%
(d)	Environmental conditions	Humid tropical climate with heavily polluted atmosphere
(e)	Operational altitude	From M.S.L. to 1900 m above M.S.L.
(f)	Isokeraunic (Thunder days) level	100 days

4.0 APPLICABLE STANDARDS

The equipment and components supplied shall be in accordance with the latest editions of the standards specified below and amendments thereof.

(a)	IEEE C57.12.90:2015	IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers.
(b)	IEC 61010-1:2010	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements.
(c)	IEC 61326-1:2012	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements

Material conforming to other International Standards which are equal to or higher but not less stringent than the Standards stipulated above may be offered. When such alternative Standards are used, reference to such Standards shall be quoted and English language copies of such Standards shall be provided with the offer.

However in the event of discrepancy, details given in this CEB specification supersede above standards.



5.0 BASIC FEATURES

The Three Phase Transformer Turns Ratio Tester shall comply with the measurement method in accordance with IEEE C57.12.90:2015 standard to test transformer turns ratio on real time basis and also store them over a period for retrieval and analysis using inbuilt facilities and for downloading to a computer for analysis. It shall be a portable device having an intrinsically safe and of compact lightweight design suitable for outdoor use (drip and dust proof), under service conditions mentioned in clause 3.0.

5.1. Power Supply

Transformer Turns Ratio Tester shall be able to operate in power supply parameters specified in clause 2.0 with a voltage variation of $\pm 10\%$.

5.2. Measuring Parameters

The Transformer Turns Ratio Tester shall be designed to conveniently measure following parameters with specified accuracy;

Parameter	Range(min.)	Accuracy(min.)
Turns Ratio	1-2000	$\pm 0.10\%$
Excitation Current	0 to 500 mA	$\pm 2\%$ (3 digit resolutions)
Phase Angle	0-360 degrees	± 0.05 degrees (2 decimal points display)

5.3. Excitation Voltages

At least up to 40V by multiple steps at 50Hz shall be available.

5.4. Storage Capacity

It shall be provided inbuilt circuitry for storage of at least 120 data records. Additional external storage facilities are also preferable.

5.5. Display

A colour backlit display shall be provided with easily readable fonts viewable in direct sunlight and low light levels. A resolution of 5 digits shall be provided for all ratios.

5.6. Safety

The Transformer Ratio Tester shall comply with the safety requirements specified in IEC 61010-1.

5.7. Carrying Case and Accessories

A weather proof hard carrying case suitable for rough use and transport shall be provided. All the cable accessories such as power cables, test leads shall be provided with the Transformer Ratio Tester.



5.8. Computer Software

Software should be provided with the equipment to configure, download and analyze the data. The software should be run on Microsoft Windows platform and compatible with latest Microsoft Windows version 7, 8.1 or 10.

5.9. Printer Interface

Test results shall be printable via the computer software or directly from the device.

5.10. Communication with PC

Transformer Turns Ratio Tester shall be provided with all accessories which are necessary to connect to a PC via USB interface.

6.0 REQUIREMENTS FOR SELECTION

6.1. Quality Assurance

The manufacturer shall possess ISO 9001:2015 or latest Quality Assurance Certification valid throughout the delivery period of this bid, for the manufacture of offered Transformer Turns Ratio Tester where manufacturing is intended. The Bidder shall furnish a copy of the ISO certificate certified as true copy of the original by the manufacturer, along with the offer.

6.2. Manufacturing Experience

The manufacturer shall have minimum of five (5) years experience in manufacturing measuring equipment as applicable. Out of this period offered item should have been supplied successfully outside the country of the manufacturer for minimum of two (2) years for usage in utilities.

6.3. Test Certificates

Following test certificates shall be furnished with the offer;

- (a) To confirm the operational/functional performance of the Transformer Turns Ratio Tester indicated in clause 5.2.
- (b) Electromagnetic compatibility (EMC) tests as per IEC 61326-1. The EMC test certificates shall clearly identify the equipment concerned showing the Manufacturer's identity, type number and basic technical parameters.

7.0 INFORMATION TO BE FURNISHED WITH THE OFFER

The following shall be furnished with the offer.

- (a) Following technical details in English clearly identifying the offered items, but not limited to:
 - (i) Comprehensive catalogues.
 - (ii) Dimensional drawings.
 - (iii) Schematic diagrams.
 - (iv) Calculations, graphs and tables.
 - (v) Operational literature.



- (b) ISO 9001:2015 or latest Quality Assurance Certificate in accordance with clause 6.1.
- (c) Manufacturer shall furnish a list of supplies with supplied item, purchaser (specifying address contact persons and contact details, country), year & quantity to prove his manufacturing experience and outside the country sales in accordance with Clause 6.2.
- (d) Test Certificates in accordance with the clause 6.3.
- (e) Duly filled and signed 'Annex - B: Schedule of Technical Requirements and Guaranteed Technical Particulars'.

Not furnishing above documents and details may result in offer being rejected.

8.0 PERFORMANCE GUARANTEES AND WARRANTY

Manufacturer should provide CEB a warranty ensuring that items supplied meet the specification and any defected items shall be replaced without extra cost during the first three years after the final delivery to CEB stores.

9.0 SAMPLES

Not Applicable.

10.0 SPARES

Not Applicable.

11.0 PACKING AND LABELING/MARKING

11.1. Packing

Each Transformer Turns Ratio Tester shall be suitable packed separately in a bio-degradable packing material to withstand rough handling and carry a label indicating the name of item, model/type No. etc.

11.2. Identification and Labeling/Marking

Each Transformer Turns Ratio Tester shall carry a weather and corrosion proof Rating Plate indicating the following particulars.

- (a) Country of manufacture, manufacturing year and manufacturer's identification.
- (b) Model or type number (as per catalogue)
- (c) Serial no.
- (d) Warranty period
- (e) Voltage level applicable and frequency
- (f) Number and Year of Standard adopted.



12.0 INSPECTION AND TESTING

Depending on the choice of the applicable standards, relevant Routine/Functional Test Certificates conforming to, but not limited to, standards in clause 4.0 shall be furnished for the observation of the Engineer appointed by the CEB at the time of inspection unless CEB waive off the inspection. In addition, the routine test certificates shall be sent with the shipment of the items.

13.0 ANNEX

Annex A: Schedule of Technical Requirements and Guaranteed Technical Particulars

Annex B: Non – Compliance Schedule



ANNEX -A

SCHEDULE OF TECHNICAL REQUIREMENTS AND GURANTEED TECHNICAL PARTICULARS

(This schedule shall be duly filled by the Manufacturer)

		Offered
1.	Name of the manufacturer	
2.	Country of origin	
3.	Make/Model No.	
4.	Supply Voltage applicable	V
5.	Rated frequency	Hz
6.	Applicable standards	
7.	Display Type	
8.	Excitation Voltage Range	V
9.	Ratio Measurement Range	
10.	Accuracy of Ratios	
11.	Excitation Current (max.)	mA
12.	Accuracy of Excitation Current	
13.	Phase Deviation	deg
14.	Accuracy of Phase Deviation	
15.	Printer Interface	
16.	Internal Data Storage	
17.	Warranty	
18.	Whether all cables/test leads provided with the item?	
19.	Whether a certified copy of ISO 9001:2015 or latest furnished with the offer?	
20.	Whether the entire Test Certificates in accordance with clause 6.3 furnished with the offer?	
21.	Whether markings provided as per clause 11.2?	
22.	Whether the information requested in clause 7 furnished with the offer?	

.....
Signature of the Manufacturer and seal

.....
Date

I/We certify that the above data are true and correct

.....
Signature of the Bidder and seal

.....
Date



Annex – B

Non-Compliance Schedule

On this schedule the bidder shall provide a list of non-compliances with this specification, documenting the effects that such non-compliance is likely to have on the equipment life and operating characteristics. Each non-compliance shall be referred to the relevant specification clause.

Clause No.	Non-Compliance

.....
Signature of the Manufacturer

.....
Date

I/We certify that the above data are true and correct

.....
Signature of the Bidder and seal

